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IS 7931-3 (1975): Automatic and semi-automatic welding equipment with self-adjusting arcs (MIG/MAG Processes): Part 3 Welding gun and ancillary equipment [ETD 21: Electric Welding Equipment]



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IS : 7931 (Part III) - 1975

Indian Standard

**SPECIFICATION FOR AUTOMATIC AND
SEMI-AUTOMATIC WELDING EQUIPMENT
WITH SELF-ADJUSTING ARCS
(MIG/MAG PROCESSES)**

PART III WELDING GUN AND ANCILLARY EQUIPMENT

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**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

SPECIFICATION FOR AUTOMATIC AND SEMI-AUTOMATIC WELDING EQUIPMENT WITH SELF-ADJUSTING ARCS (MIG/MAG PROCESSES)

PART III WELDING GUN AND ANCILLARY EQUIPMENT

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SPECIFICATION FOR AUTOMATIC AND SEMI-AUTOMATIC WELDING EQUIPMENT WITH SELF-ADJUSTING ARCS (MIG/MAG PROCESSES)

PART III WELDING GUN AND ANCILLARY EQUIPMENT

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 30 December 1975, after the draft finalized by the Electric Welding Equipment Sectional Committee had been approved by the Electrotechnical Division Council

0.2 There are numerous variations of arc welding processes using consumable electrode wires. The wire may be solid or composite, and with or without flux. In all these cases, the melting generally takes place in the presence of a shielding gas. This gas may be inert (for example, argon) or have a definite chemical activity at the high temperature of the electric arc (for example, carbon dioxide) when the shielding gas is inert the welding process is known as MIG process and when this gas has a definite chemical activity at the high temperature of the electric arc this process is called MAG process.

0.3 Because of the wide variations in equipment and processes it is not practicable at present to specify the performance and the test requirements. These shall be a matter of agreement between the supplier and the purchaser.

0.4 This standard on automatic and semi-automatic welding equipment is being issued in three parts. This part covers welding gun and ancillary equipment while dc generator power sources are covered in Part I and transformer rectifier power sources in Part II.

0.5 In preparing this standard, assistance has been derived from the following:

ISO Doc. TA-76/72/E Specification of arc-welding equipment using consumable wires (MIG-MAG processes). International Organization for Standardization.

Document No. 71/42369 — Draft British Standard specification for arc welding plant, equipment and accessories (*revision* of BS 638-1966). British Standards Institution.

NEMA EW -1-1971 Electric arc-welding apparatus. National Electric Manufacturers' Association, USA.

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0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960* The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard

1. SCOPE

1.1 This standard (Part III) covers the general and safety requirements and test methods of welding gun and ancillary equipment for automatic and semi-automatic electric welding with self-adjusting arcs (MIG/MAG processes)

2. TERMINOLOGY

2.0 In addition to those given under 2.1 to 2.3, the definitions given under 2 of IS 7931 (Part I) 1975† shall apply.

2.1 Welding Gun — A current carrying device which is held and guided by an operator and through which a continuous consumable electrode is fed to the welding arc around which a suitable shielding gas may flow from a nozzle at the exit end of the device.

2.2 Welding Head — A device for fulfilling the same functions as that of welding gun, which is mechanically supported when in use and may incorporate gas shielding means and may incorporate a wire feed mechanism

2.3 Wire Feed Unit — Equipment for feeding a continuous consumable electrode at a controlled rate to a welding gun or welding head.

3. DESIGN AND CONSTRUCTION

3.1 Welding Guns

3.1.0 The design and construction of welding guns shall satisfy the requirements specified in 3.1.1 to 3.1.17.

3.1.1 Guns shall be air, liquid or gas cooled.

3.1.2 The guns shall be so designed that welding can be carried out with a minimum of effort by the operator and shall permit satisfactory feed of the specified range of wires when used with the approved wire feed unit.

*Rules for rounding off numerical values (revised).

†Specification for automatic and semi-automatic welding equipment with self-adjusting arcs (MIG/MAG processes) - Part I dc welding generator power source

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3.1.3 The handle shall be so positioned as to prevent undue heating of the operator's hand. Hand guards, if fitted, shall not cause interference with the welding operation.

3.1.4 Handles shall be constructed of or encased in insulating materials or they shall be insulated from the live parts

3.1.5 The construction of handles shall be such that no dirt which is likely to cause danger of electric shock can lodge in joints, holes or other crevices, and that the live ends of pins or screws cannot become exposed in use

3.1.6 All exposed metal with the exception of the contact tip shall be insulated from current carrying parts.

3.1.7 The terminals for electrical connections shall be of adequate size so as to allow connections of cables of appropriate rating without being overheated under normal conditions of use

3.1.8 The risk of damage due to continuous flexing of cables and hoses at the point of entry to the gun shall be kept to a minimum.

3.1.9 Parts shall be adequately rated to prevent excessive temperature-rise.

NOTE — Because of the wide variation in equipment and processes it is not at present practicable to specify temperature-rise tests

3.1.10 The gun shall be able to direct an adequate flow of shielding gas under all conditions of welding for which the gun is designed.

3.1.11 The shielding gas and/or coolant flow to the gun shall be controlled by suitable means.

3.1.12 Forced-cooled parts shall be protected by coolant flow failure devices which will prevent overheating in the event of failure.

3.1.13 Gas nozzles shall be readily replaceable and shall be made so as to remain as free from spatter as possible.

3.1.14 All parts affected by change of wire size shall have the correct dimensions for trouble-free wire feed and shall be permanently identifiable for size and type of wire.

3.1.15 For arc spot welding application, the nozzles shall be so designed that they rest on the work-piece and gas is allowed to flow around the weld

3.1.16 The voltage to earth of gun mounted controls shall not exceed 100 V dc or 60 V ac rms.

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3.1.17 Controls and parts needing regular maintenance shall be replaceable.

3.2 Cables and Hoses

3.2.0 The design and construction of cables and hoses shall satisfy the following requirements.

3.2.1 Cables and hoses, between the power source or wire feed unit and the gun, which are attached to the gun shall be capable of carrying:

- a) welding current,
- b) shielding gas,
- c) cooling liquid or gas (if required),
- d) electrode wire, and
- e) control leads and auxiliary supplies.

3.2.2 Cables and hoses shall be capable of being flexed without undue wear or blockage of wire feed and gas/liquid flow.

3.2.3 Cables and hoses shall be terminated at the end remote from the gun for convenient connection to the various services.

3.2.4 Cables, hoses and/or complete assemblies shall be readily replaceable.

3.3 Ancillary Equipment

3.3.1 The wire feed motor shall have provision for varying the electrode wire feed speed and shall be continuously rated and suitably protected. It shall be capable of being started frequently without injury or overheating and, together with the drive unit, shall be suitably insulated.

3.3.2 The drive unit shall have provision for easy replacement of electrode wire and for change of electrode wire size. Drive roll pressure shall be adjustable and a quick release device shall be fitted.

3.3.3 The wire reel shall be insulated from earth and easily detachable. Where necessary, the wire reel shall be suitably guarded to prevent accidental contact. Means shall be provided for preventing over-run of wire.

4. MARKING

4.1 Following information shall be legibly and indelibly marked on the welding gun and ancillary equipment:

- a) Manufacturer's name or trade-mark, and
- b) Manufacturer's type and serial number.

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TO
IS : 7931 (Part III) - 1975 SPECIFICATION FOR
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Addendum

(*Page 7, clause 5.1*) — Add the following para at the end of this clause:

'For this test, the surface of the handle shall be wrapped securely in metal foil to within 12 mm of the ends of the handle. The handle shall be wiped dry before wrapping with foil '

(ETDC 21)

Reprography Unit, BIS, New Delhi, India

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4.1.1 Welding gun and ancillary equipment may also be marked with the ISI Certification Mark.

NOTE -- The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. TYPE TESTS

5.0 Gun shall be subjected to the following type tests in the order prescribed:

- a) Insulation resistance test (*see 5.1*),
- b) High voltage test (*see 5.2*), and
- c) Performance test (*see 5.3*).

These tests shall also be carried out as routine tests.

5.1 Insulation Resistance Test — The insulation resistance shall be measured with a dc voltage of about 500 volts applied for a sufficient time for the reading of the indicator to become practically steady, such voltage being taken from an independent source or generated in the measuring instrument. The insulation resistance shall be not less than 2 megohm.

5.2 High Voltage Test — Following the test for insulation resistance, the gun shall be dried for 1 hour at a temperature not exceeding 40°C, and then with the metal foil(s) still in position it shall be capable of withstanding a voltage of 2 000 volts rms at 50 Hz applied for one minute between the contact tip and the foil on the handle.

5.3 Performance Test — The criteria for performance test and the requirements shall be a matter of agreement between the supplier and the purchaser.

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 331 01 31

331 13 75

Telegrams : Manaksanstha

(Common to all Offices)

Regional Offices :

		Telephone
Central	Manak Bhavan, 9, Bahadur Shah Zafar Marg NEW DELHI 110002	{ 331 01 31 331 13 75
* Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054	37 86 62
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† Western	: Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95

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